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Introduction

Alistair M. C. Isaac

We communicate in order to coordinate action. This insight has motivated a growing literature which applies game theoretic models to communication scenarios. By treating signals as actions in a game in which payoffs depend upon the transmission of information, the solution concepts of traditional game theory and the dynamics of evolutionary game theory can be employed to explain a variety of linguistic, more generally communicative, phenomena. This volume collects recent work in this tradition.

A theme which unites the papers in the present volume is an interest in *bounded rationality*—those norms which govern agents who are computationally or epistemically limited. These bounded agents cannot satisfy the norms of ideal rationality, yet they more accurately model the strategic dilemmas of real agents in real communication scenarios. Bounded rationality manifests itself in the present papers in two ways: first, they consider communication scenarios in which limitations on information transfer are explicitly part of the model (whether due to noise (De Jhaeger and van Rooij), vagueness (O'Connor; Blume and Board), or unawareness (Franke)); second, they appeal to norms of rationality for agents with limited computational abilities.

Traditionally, game theoretic analyses divide into those which are “high rationality,” assuming that agents can reason in an arbitrarily complex way about the higher order beliefs of their opponents (e.g. Nash equilibrium), and those which are “low rationality,” assuming agents merely react to observed frequencies, or their neighbors’ behavior (e.g. reinforcement learning). Yet more subtle positions along this spectrum are also possible. Jäger, for instance, considers equilibria which are rationalizable, i.e. can be supported by a small number of iterations of a computable algorithm. This produces solution concepts between the traditional high and low, including both his own Iterated Cautious Response and the Iterated Best Response solution investigated by Franke. Huttegger, Skyrms, and Zollman consider a learning rule, Probe and Adjust, which is even “lower” in rationality than reinforcement learning (as it depends only on the most recent move, rather than all past moves). O'Connor also proposes a new learning dynamic, though hers depends on enriching reinforcement learning with the plausible

hypothesis that “incorrect” actions may be reinforced when they are sufficiently “close” to the “correct” action. Bridging these traditions, De Jhaeger and van Rooij examine high and low rationality equilibrium selection arguments within a single framework.

Finally, these papers are unified by an interest in complicating and synthesizing pre-existing work, moving beyond overly idealized formulations of communication scenarios. Barrett, for example, examines the simultaneous evolution of theory and language in order to provide a more realistic analysis of scientific theory change and Kuhnian incommensurability. Both Jäger and De Jhaeger and van Rooij provide helpful surveys of the literature, the former unifying a number of pragmatic phenomena under a single solution concept, the latter synthesizing work on game theoretic pragmatics and signaling within a single framework, revealing new commonalities between common-interest and conflict-of-interest communication paradigms. Franke also unifies disparate pragmatic phenomena under a single analysis, in his case in terms of unawareness of alternatives. O'Connor and Blume and Board together provide dual (respectively) low- and high-rationality analyses of vagueness, the former giving conditions for the evolution of vagueness, the latter exploring the strategic value of intentional vagueness for mitigating conflict.

This collection began as the Stanford University conference on *Game Theory and Communication*, sponsored by the Cognition and Language Workshop and held at the Center for the Study of Language and Information, May 28–9, 2010. It includes both papers originally presented at that conference and thematically related papers written specifically for this special issue. Extensive thanks to Sven Lauer and Thomas Icard who organized the original conference with me and helped with the early stages of editing this volume; thanks also to Stanley Peters, faculty advisor of the Cognition and Language Workshop and director of CSLI. Financial support for the conference was provided by CSLI and the Stanford Humanities Center. Finally, thanks to Hannes Leitgeb and the editors of *Erkenntnis* for giving this collection a home.

~ University of Pennsylvania
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